

REMARKS

Claims 1-15 are pending after entry of this paper. Claims 1-14 have been rejected. Claim 15 has been objected to as being dependent on a rejected base claim, but is otherwise allowable. Claims 4-7 have been cancelled without prejudice. Claim 1 has been amended to incorporate the subject matter of the now cancelled claim 7.

Claim 1 has been amended to recite “extracting, in the first extraction stage, copper from the aqueous solution coming from the leaching stage into a first *copper-depleted* organic extraction solution ...” and “extracting, in the second extraction stage, copper from the neutralized aqueous solution into a second *copper-depleted* organic extraction solution ...” (emphasis added). Support for these amendments may be found throughout the instant specification; for example at page 8, lines 9-10.

Claim 1 has also been amended to recite “transferring a first organic extraction solution and a second organic extraction solution to a stripping stage where copper is transferred from the first and second organic extraction solutions into an aqueous solution of sulphuric acid forming a copper-depleted organic extraction solution.” Support for this amendment may be found throughout the instant specification, for example at page 5, lines 27-28 and page 8, lines 7-9.

Claim 1 has been further amended to recite “transferring the copper-depleted organic extraction solution to: the first extraction stage forming the first copper-depleted organic extraction solution and the second extraction stage forming the second copper-depleted organic extraction solution.” Support for this amendment may be found throughout the instant specification, for example at page 5, lines 23-25; page 8, line 9-10; and Figure 1.

No new matter has been introduced by these amendments. Reconsideration and withdrawal of the pending rejections in view of the above claim amendments and below remarks are respectfully requested.

Response to Rejections under 35 U.S.C. §103

Claims 1-3, 7-9, 11, and 13 have been rejected under 35 U.S.C. §103(a) for allegedly being obvious over U.S. Patent No. 4,230,487 to DeMarthe, et al. (“DeMarthe”), in view of U.S. Patent No. 4,272,492 to Jensen, et al. (“Jensen”), and further in view of U.S. Patent No. 5,230,786 to Preidel (“Preidel”). Specifically, the Examiner contends that the copper recovery process of Jensen with the process of DeMarthe would have been obvious since Jensen allegedly teaches that liquid-liquid extraction of copper is well known (Office Action, page 5). Applicants respectfully disagree for the reasons set forth below.

According to the Examiner, DeMarthe teaches a method for selectively solubilizing the non-ferrous metals in sulfurized ores and concentrates (Office Action, page 2). The method disclosed in DeMarthe requires a second stage for “[t]he cupric chloride [to be] regenerated” using “air at atmospheric pressure and hydrochloric acid” (column 5, lines 22-25). In contrast to DeMarthe’s two stage method, instant claim 1 recites a leaching procedure where the copper chloride, hydrochloric acid, and oxydating agent are fed into a single leaching stage (Figure 1). In sum, the instant invention does not include a second stage for regenerating the cupric chloride as required by DeMarthe and is therefore distinct over the prior art.

Moreover, the Examiner admits that DeMarthe does not teach the further steps of feeding, extracting, partitioning, feeding, neutralizing, feeding, extracting, transferring, and feeding as in claim 1 (Office Action, page 3). The Examiner applies Jensen for allegedly

teaching selectively extracting and recovering copper from acidic solutions such as those obtained by leaching copper ore (Office Action, page 3). Applicants respectfully disagree that the teachings of Jensen remedy the deficiencies of DeMarthe to arrive at the invention as instantly claimed, namely the steps of leaching, adjusting, feeding, extracting, partitioning, feeding, neutralizing, feeding, extracting, transferring, transferring and feeding as recited in amended claim 1.

Specifically, Jensen does not disclose *i)* partitioning the aqueous solution coming from the first extraction stage into a first part and a second part; *ii)* feeding the first part of the aqueous solution back to the leaching stage; *iii)* neutralizing the second part of the aqueous solution; *iv)* feeding the neutralized aqueous solution into the second extraction stage; *v)* transferring the first and second organic extraction solutions to a stripping stage where copper is transferred from the first and second organic extraction solutions into an aqueous solution of sulphuric acid forming a copper-depleted organic extraction solution; and *vi)* transferring the copper-depleted organic extraction solution to: the first extraction stage forming the first copper-depleted organic extraction solution and the second extraction stage forming the second copper-depleted organic extraction solution (claim 1).

The Examiner contends that the partitioning step is met by extraction step 22 with stream 19 going to the pH control and stream 15 going to stream 40 of Jensen (Office Action, page 4). Jensen fails to disclose a partitioning step because two separate streams 15 and 19 exit the first extraction stage 22, where stream 15 is an *extractant* and stream 19 is an *aqueous solution*. Jensen also does not disclose a partition of the aqueous solution of stream 19 (Figure 2). Moreover, the aqueous solution of stream 19 illustrated on Figure 2 of Jensen is fed directly to extraction stage 30 without the partitioning required by claim 1. In addition, stream 40 of

Jensen is also not a partition of the aqueous solution stream **19** because different aqueous solutions are used in stripping stages **23** and **24** and extraction stages **28** and **29** (column 10, lines 35-40; Figure 2). The instant claimed invention, however, describes the partitioning of the *sole aqueous solution* exiting the first extraction stage into a first part and a second part. Jensen, therefore, fails to disclose the “partitioning the aqueous solution coming from the first extraction stage into a first part and a second part” step of claim 1.

The Examiner contends that it would be obvious to recycle copper feed from which copper chloride is selectively extracted as an acidic leach solution to reduce operating costs (Office Action, page 4). However, Jensen fails to disclose that the acidic leach solution is to be recycled *between* extraction stages as recited in the claimed invention (claim 1, Figure 1). Therefore, the “feeding the first part of the aqueous solution back to the leaching stage” step of claim 1 is also distinguishable over the cited art.

Although ammonia or other neutralization agents are added via stream **17** to extraction stage **30** (Office Action, page 4), Figure 2 of Jensen illustrates that the aqueous solution of stream **19** is neutralized *after* it is fed to the second extraction loop (i.e., stage **30**). In contrast, neutralization in the claimed invention occurs *between* extraction stages to prevent oxidation and thus spoiling of the organic solution (claim 1; Figure 1). Therefore, the “neutralizing the second part of the aqueous solution” step and the “feeding the neutralized aqueous solution into the second extraction stage” step of claim 1 are also distinguishable over the cited art.

The Examiner also states that the first and second organic solutions are sent to stripping stages **31** and **32** via **50**, from which copper is electrowon (Office Action, page 4). Applicants respectfully disagree that the first and second organic solutions are sent to the same

stripping stage in Jensen because the organic solution (i.e., extractant) used in the first extraction loop (stream **15**) is transported via a closed loop conduit and is not sent to stripping stages **31** and **32** for subsequent electrowinning (Figure 2). Moreover, the first and second organic solutions cannot be sent to the same stripping stage because the extractant used in the first extraction loop (stream **15**) differs from the extractant used in the second extraction loop (stream **50**). Jensen also discloses that a *tertiary amine extractant* is countercurrently transported via stream **15** (i.e., the first extraction loop) (column 6, lines 49-51). Jensen states that the loaded *hydrogen ion exchange* extractant is transported via stream **50** (i.e., the second extraction loop) to stripping stages **31** and **32** (column 11, lines 16-18). Similarly, Figure 2 of Jensen identifies stream **15** as COPPER CHLORIDE EXTRACTANT and stream **50** as HYDROGEN ION EXCHANGE EXTRACTANT. Accordingly, the first and second organic solutions of Jensen are not sent to the same stripping stage for eventual electrowinning in contrast to the claimed invention. Nor could the organic extraction solutions be sent to the same stripping stage (instant Figure 1) as claimed because different extractants are used. Therefore, Jensen also fails to disclose the “transferring the first and second organic extraction solutions to a stripping stage where copper is transferred from the first and second organic extraction solutions into an aqueous solution of sulphuric acid forming a copper-depleted organic extraction solution” step of claim 1.

The Examiner states that the stripping solution in Jensen is sulfuric acid, suggesting that the stripping solution is the same as that used in the claimed invention (Office Action, page 4). However, Applicants assert that Jensen has two stripping stages where only the stripping solution in the second extraction loop **54** of Jensen is sulfuric acid. In contrast, the stripping solution in the first extraction loop **40** of Jensen “may be characterized as a weakly acidic aqueous solution containing a relatively small amount of copper” (column 10, lines 29-

31), i.e., not a strong sulfuric acid. Therefore, not only does Jensen have two separate stripping solutions compared to one in the claimed invention, one of them is not an aqueous solution of sulphuric acid. Applicants respectfully direct the Examiner to the claimed invention which “transfer[s] the first and second organic extraction solutions to a stripping stage where copper is transferred from the first and second organic extraction solutions into an aqueous solution of sulphuric acid forming a copper-depleted organic extraction solution” (claim 1). Therefore, the instant invention is distinct over the cited art.

Regarding previously pending claim 7 (now incorporated into amended claim 1), the Examiner contends that Figure 2 of Jensen shows parallel flow (Office Action, page 4). Applicants respectfully disagree because Figure 2 does not show parallel flow. The Examiner’s attention is directed to Figure 1 of Jensen which demonstrates that each extraction stage (i.e., stages **3** and **7**) operates in *series* with respect to the associated organic extraction solution (i.e., extractant). Specifically, extractant streams **4** and **8** of Figure 1 are transferred in series to extraction stages **3** and **7**, respectfully. This contrasts with the claimed invention where the organic extraction solution exiting the stripping stage forms the organic extraction solution feed streams (i.e., the copper-depleted organic extraction solutions) for both the first extraction stage and the second extraction stage (Figure 1). In other words, the extraction stages in the claimed invention operate *in parallel* with respect to the organic extraction solution (Specification page 5, lines 24-25).

Furthermore, Jensen cannot operate in parallel as required by Applicants’ previous claim 7 (now claim 1) because the extractants used in the first and second extraction loops of Jensen are different as discussed *supra*. Whereas, the extractants (i.e., organic extraction solutions) in the claimed invention are the same, and the copper-depleted organic

extraction solution is fed to both extraction stages from a single stripping stage (Specification page 5, lines 23-25; Fig. 1). Hence, the “transferring the copper-depleted organic extraction solution to: the first extraction stage forming the first copper-depleted organic extraction solution and the second extraction stage forming the second copper-depleted organic extraction solution” step of amended claim 1 is also distinct over the prior art.

Applicants also respectfully submit that the choice of reference electrodes in Preidel has no bearing on patentability of the instant claims. Moreover, Preidel does not remedy any of the above-discussed deficiencies in DeMarthe and Jensen.

For the above reasons that the DeMarthe process of solubilizing non-ferrous metals combined with Jensen’s copper-recovery process, even with Preidel, does not satisfy all of the elements of the instant claims, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §103 rejection of claims 1-3, 8-9, 11, and 13 and the objection to claim 15.

Dependent claims 10 and 14 have been rejected under U.S.C. §103(a) for allegedly being obvious over DeMarthe in view of Jensen and Preidel as above, and further in view of U.S. Patent No. 3,476,553 to Ray, et al. (“Ray”). The Examiner admits that DeMarthe in view of Jensen and Preidel does not disclose using alkali precipitation as claimed (Office Action, page 5). The Examiner contends that Ray et al teaches recovering metals in solution by introducing hydroxyl ions (Office Action, page 5). Applicants respectfully disagree.

Nevertheless, Ray does not remedy the deficiencies of DeMarthe, Jensen, and Preidel as set forth above, namely Ray does not teach partitioning the aqueous solution coming from the first extraction stage into a first part and a second part, feeding the first part of the aqueous solution back to the leaching stage, neutralizing the second part of the aqueous solution,

feeding the neutralized aqueous solution into the second extraction stage, transferring the first and second organic extraction solutions to a stripping stage where copper is transferred from the first and second organic extraction solutions into an aqueous solution of sulphuric acid forming a copper-depleted organic extraction solution, and transferring the copper-depleted organic extraction solution to: the first extraction stage forming the first copper-depleted organic extraction solution and the second extraction stage forming the second copper-depleted organic extraction solution (claim 1). The subject matter of the dependent claims 10 and 14 are further distinguished over the art of record.

Dependent claim 12 is rejected under U.S.C. §103(a) for allegedly being obvious over DeMarthe in view of Jensen and Preidel as above, and in further view of U.S. Patent No. 4,082,629 to Milner, et al. ("Milner"). The Examiner admits that DeMarthe in view of Jensen and Preidel does not disclose the precipitation step as claimed (Office Action, page 6). However, Milner allegedly teaches treating complex sulfide concentrates (Office Action, page 6). Applicants respectfully disagree.

Milner does not remedy the deficiencies of DeMarthe, Jensen, and Preidel as set forth above. Namely, Milner does not teach partitioning the aqueous solution coming from the first extraction stage into a first part and a second part, feeding the first part of the aqueous solution back to the leaching stage, neutralizing the second part of the aqueous solution, feeding the neutralized aqueous solution into the second extraction stage, transferring the first and second organic extraction solutions to a stripping stage where copper is transferred from the first and second organic extraction solutions into an aqueous solution of sulphuric acid forming a copper-depleted organic extraction solution, and transferring the copper-depleted organic extraction solution to: the first extraction stage forming the first copper-depleted organic extraction solution

and the second extraction stage forming the second copper-depleted organic extraction solution (claim 1). Therefore, the subject matter of dependent claim 12 is also distinguished over the art of record.

In summary, the combination of DeMarthe, Jensen, and Preidel does not teach each and every element of the instant claims. These deficiencies are not remedied by Ray and/or Milner, either alone or in combination. Thus, Applicants respectfully submit that the invention as recited in the instant claims are patentably distinct over the art of record and respectfully request reconsideration and withdrawal of the 35 U.S.C. §103 rejection of dependent claims 10, 12, and 14.

Dependent Claims

Applicants have not independently addressed all of the rejections of the dependent claims. Applicants submit that for at least similar reasons as to why independent claim 1 from which all of the dependent claims 2, 3, and 8-15 depend are believed allowable as discussed *supra*, the dependent claims are also allowable. Applicants however, reserve the right to address any individual rejections of the dependent claims and present independent bases for allowance for the dependent claims should such be necessary or appropriate.

CONCLUSION

Based on the foregoing amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-3 and 8-14 and the objection to claim 15. Allowance of this application is also respectfully requested. Favorable action by the Examiner is earnestly solicited.

AUTHORIZATION

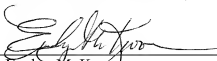
The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. **13-4500**, Order No. 4819-4738.

In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. **13-4500**, Order No. 4819-4738.

Respectfully submitted,
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